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ABSTRACT

Ohio Wesleyan University has responded to the challenge of costing in colleges and universities by implementing a computer-based costing system, beginning with the fiscal year ending June 30, 1970. This document describes the Ohio Wesleyan system that provides direct instructional cost per student enrolled for each individual course section, as well as average cost per student and average cost per credit unit for each academic discipline based on the classifications of the Higher Education General Information Survey (HEGIS). Emphasis is placed on the means to evaluate financial priorities, completion of information subsystems, and a reconciled totals with accounting records. (MJM)

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INSTRUCTIONAL COSTING AT OHIO WESLEYAN

By Keith W. Mathews

Costing for colleges and universities has become an issue of great concern in higher education. Interest in the need for cost data and debate concerning (1) procedures for developing data and (2) legitimate conclusions that can be drawn from data are evidenced by such developments as revision of the NCHEMS *Cost Analysis Manual* and evaluation of the manual (now in progress) by the NACUBO Costing Standards Committee; recommendations for national standards for costing from the National Commission on the Financing of Postsecondary Education; and a critical response to the commission's report from the Costing Standards Committee.

Costing System Implemented

Ohio Wesleyan University has responded to the challenge of costing in colleges and universities by implementing a computer-based costing system, beginning with the fiscal year ended June 30, 1970. The system is relatively simple. It provides direct instructional cost per student enrolled for each individual course section, as well as average cost per student and average cost per credit unit for each academic discipline. The term "academic discipline" refers to course offerings grouped according to classifications of the Higher Education General Information Survey of the U.S. Office of Education (HEGIS). Generally, this grouping corresponds to the university's departmental structure, although for administrative convenience, there are a few cases of multiple discipline offerings in a single department. Since the system focuses on HEGIS disciplines rather than on departments, it facilitates interinstitutional use and comparisons.

Direct instructional cost includes all faculty compensation (salary and fringe benefits) plus other academic department expenditures. Indirect costs, which are not allocated to academic disciplines, include library expenditures, student services, operation and maintenance of plant, general administration, general expense, and student aid. Allocation of these costs is cumbersome and arbitrary and would make the unit cost figures less useful. Ohio Wesleyan has a fairly stable enrollment, in the 2,300-2,400 range. Since no significant change is planned in this enrollment, decisions about academic offerings seldom affect indirect costs. Conversely, decisions concerning programs such as student services and plant maintenance seldom affect instructional costs.

No attempt is made to go beyond academic discipline (course offering) costs and calculate the cost of student majors. Such calculation presumes the existence of an established, fairly rigid pattern of courses for each major. At this liberal arts college the requirements for a major comprise less than half of a student's total course load. Students are encouraged to take a wide range of courses according to their personal interests. Therefore, any computed costs of student majors, based on derived average course loads, would be too imprecise and arbitrary to be useful.

The impetus for Ohio Wesleyan's costing system came from two long-range planning committees, the first of which was appointed in 1968. The institution then faced a number of decisions about new construction, enrollment, and finances. In the mid-1960s the enrollment gradually had increased from 2,100 to 2,500 students, with approximately equal numbers of men and women. To raise $7 million for plant and endowment, the institution had undertaken a capital fund drive which ultimately was successful.

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However, by 1968, doubts about enrollment were beginning to surface. The institution also had sustained a minor current fund deficit for the fiscal year ending June 30, 1968.

The first long-range planning committee made a thorough study of the goals of the institution and the related implications for resources. The committee membership included faculty, administrators, and students, with the majority being faculty members. An early working paper of the long-range planning committee emphasized the importance of cost analysis.

The university controller, as a member of the long-range planning committee, supplied and interpreted financial data. In response to concern about cost analysis, all routine reports were furnished, plus studies of course costs for several fiscal years. The initial cost studies were prepared manually, and could be considered largely experimental. The resulting discussions clarified many procedural points with regard to unit cost computations at Ohio Wesleyan. While this committee never issued a formal report, due to the resignation of the university president, it continued its work into 1969 and accumulated a significant file of working papers which helped to clarify the college's sense of direction and purpose.

Financial Priorities Evaluated

A new long-range planning committee was appointed in December 1970, including many members of the previous committee. One of three subcommittees examining financial and space priorities received the first computer-prepared reports from the instructional cost system discussed in this paper—reports which served as the raw material for a thorough evaluation of financial priorities in the instruction area. The influence of this material on the committee can be seen in the following recommendations from the final report (issued October 11, 1971):

> One of the areas that facilitates reduction in a university's operating cost is increasing the student-teacher ratio. Although this issue raises a number of problems, the long range planning committee would like to make specific recommendations to be considered by the administration and . . . committees of the faculty.
>
> 1. A "full-load" policy should be based on the present course rule. (Deviation from this rule is an important element explaining the very high per student costs in some areas.
> 2. Courses with very few students should be combined, staggered, or cancelled.
> 3. A continuing effort should be made to reappraise course equivalences for professors in areas of student activity (such as intercollegiate sports, music, drama, debate), since these are areas of high cost.
> 4. Each professor and department chairman should receive, in confidence, a statement of facts concerning costs incurred and graduation units earned in the area of his responsibilities.
> 5. An explicit college policy should be established that voluntary severances (quits, retirements, etc.) *not* be replaced until and unless authorized by the vice president for academic affairs with the advice and consent (by majority vote) of the faculty personnel committee. In general, programs involving high cost per graduation unit should not be allowed to replace severances.
> 6. Chairmanship of a department should be without load allowance. Service as chairman should be included with other duties, such as academic advising, advising independent study, and service on time-consuming major committees, in a newly-created category for personnel evaluation established by the personnel committee. . . .

The move from manually prepared, experimental cost analysis to a computer-based system was a significant step. Instructional cost data could be produced efficiently and routinely each year, as has been the case since 1970. Necessary data therefore can be provided to the administration and faculty committees so that they may consider costs in their deliberations, as recommended by the long-range planning committee.

The instructional costing system was not developed in isolation, but is actually a subsystem in a fairly complete integrated data processing system. When this subsystem was designed in 1971, a substantial data base was available on which to build. Specifically, there were functioning integrated data processing subsystems for student and course records, accounting, and payroll. Essentially all of the data needed for the instructional cost computations were provided by those existing subsystems in easy-to-manipulate computer format. Instructional cost reports could be prepared without an integrated data processing system (IDP), but the system made the job much easier and more efficient.

Information Subsystems Completed

Also completed and functioning in 1971, but not directly related to instructional costing, were information subsystems for admissions applicants and for alumni(ae) and development. Since then student financial aid records and plant operation costing have been added. Some of the basic concepts of the integrated system are as follows:

1. *Single update sources for multiple files.* Example: a gift receipt ticket results in the updating of four computer master files—accounting, gift statistics, pledges receivable, and alumni records.
2. *Disk to disk (internal) machine processing.* Example: the computer reads status codes on the student master disk file and writes charges for tuition, room, and board on the student billing file.
3. *Single reference source for all administrative offices.* Example: after each update of the student master

disk file, student reference cards are printed for four offices—registrar, student affairs, academic affairs, and accounting.

4. *Selection features using multiple criteria.* Example: a development officer can request mailing envelopes and reference cards for alumni and others in a specific geographical area who gave more than a specified dollar amount last year but haven't given this year.

Development of the IDP system began in 1967, with the order of a second-generation computer (an IBM 1401), available at that time with a 60 percent educational discount. The configuration includes the central processing unit with 8,000 positions of storage, a 600 line-per-minute printer, a card read-punch, and 3 disk drives. Supporting unit record equipment includes keypunch machines, a verifier, a collator, and a card interpreter.

A team approach was followed in the development of each subsystem (including instructional costing). The data processing manager and the controller worked with the primary users (such as admissions director, registrar, or director of physical plant) to develop the input-output specifications, master file contents, and systems flow charts, making use of material from periodicals and published reports whenever possible. Systems designs were reviewed widely throughout the campus community before a staff averaging one full-time person and a part-time student began programming. Additional administrative data processing staff consists of two computer operators, two keypunch operators, and one verifier operator.

Exhibits 1 and 2 contain reproductions of pages from the two primary outputs of the subsystem, the Instruction Program Cost Report (Exhibit 1) and the Course Cost Report (Exhibit 2).

The word "program" is somewhat ambiguous in current educational and accounting literature. As used in these reports, the word means groups of course offerings based on the HEGIS taxonomy of academic disciplines. For example, Exhibit 1 shows that within the department of botany and bacteriology (account number 01113) there are groups of course offerings in two HEGIS disciplines: general botany (HEGIS number 0402) and bacteriology (HEGIS number 0403). Within the department of economics and business administration there are groups of courses in three HEGIS disciplines: accounting, management, and economics.

The Instruction Program Cost Report contains a summary of data which appear in detail on the Course Cost Report. Included in the summary, for each program, are total and average figures for lower level courses, upper level courses, and the entire program. (Lower level courses are taken primarily by freshmen and sophomores, and upper level by juniors and seniors.) Faculty cost represents salaries and fringe benefits. Departmental cost includes academic department expenditures for clerical

Exhibit 1
Instruction Program Cost Report Fiscal Year 1973

	Number Of Sections	Student Enrlmnt	Mean Gu Cost	Mean Std Cost	Total Cost	Faculty Cost	Dept Cost
01113 Botany + Bacteriology							
0402 Botany							
Lower Level	18	775	185	71	55,039	43,303	11,736
Upper Level	12	399	108	83	33,220	25,396	7,824
Program Totals	30	1,174	143	75	88,259	68,699	19,560
0403 Bacteriology							
Lower Level	7	127	292	127	16,148	11,584	4,564
Upper Level	14	200	453	197	39,476	30,348	9,128
Program Totals	21	327	391	170	55,624	41,932	13,692
Dept Totals					143,883	110,631	33,252
01114 Chemistry							
1905 Chemistry							
Lower Level	33	841	[illegible]	104	87,139	64,996	22,143
Upper Level	17	342	213	125	42,662	31,255	11,407
Program Totals	50	1,183	242	110	129,801	96,251	33,550
Dept Totals					129,801	96,251	33,550
01116 Economics + Bus Adm							
0502 Accounting							
Lower Level	5	162	106	106	17,098	15,328	1,770
Upper Level	1	27	128	128	3,454	3,100	354
Program Totals	6	189	109	109	20,552	18,428	2,124
0506 Management							
Upper Level	3	94	109	109	10,233	9,171	1,062
Program Totals	3	94	109	109	10,233	9,171	1,062
2204 Economics							
Lower Level	16	555	71	71	39,635	33,971	5,664
Upper Level	18	579	96	96	55,330	48,958	6,372
Program Totals	34	1,134	84	84	94,965	82,929	12,036
Dept Totals					125,750	110,528	15,222

help, supplies, expendable equipment, travel, miscellaneous, department administration, and leaves. Total cost, or the sum of these two, is divided by student enrollment to equal average (arithmetic mean) student cost. The final figure is the average cost per unit of credit earned—GU, or Graduation Unit—which is similar to the cost per semester hour or cost per quarter hour at institutions that use more conventional methods of recording credit. The computation of mean GU cost is described in succeeding paragraphs, but each reader should relate that computation to his or her institution's credit structure.

The Course Cost Report (Exhibit 2) provides figures for each individual section offered during the academic year as well as the course level and program totals and averages that appear on the Instructional Program Cost Report. For example, the reader can trace the economics totals and averages from Exhibit 2 to Exhibit 1.

The additional data in the Course Cost Report is for reference purposes. A course's enrollment—and, therefore, its student cost—can be affected by the time of day it is offered. Building and room assignment, room capacity, and percentage of room capacity used (enrollment divided by room capacity) give some insight into space utilization. There are, however, other space studies which confront that question more directly.

The blank column titled "space cost" is for possible future use. The plant operation and maintenance cost system (which accumulates operating and maintenance expenditures by facility, such as buildings and tracts of campus land) could be used to develop a classroom charge that would be based on actual expenditures made for a particular building. Such figures would be more useful than a mere allocation of aggregate plant costs based on square feet of space.

Exhibit 2

Course Cost Report Fiscal Year 1973

Course Number	Course Name	Std Enrl	Rm Cap Used	Std Cost	Total Cost	Faclty Cost	Dept Cost	Space Cost	Credt	Rm Cap	Max Enrl	Time	Bld	Rm	Term
	2204 Economics														
	Lower Level														
Ec 091B	Prosp For Steady St	021	0.53	113	2,367	2,013	354		1	040			Ed	24	Fa
Ec 092B	Welfare Econ + Justice	013	0.33	165	2,140	1,786	354		1	040		1100	Ed	24	Wi
Ec 092C	Poverty In Affl St	020	0.36	130	2,597	2,243	354		1	055		1100	Ed	27	Wi
Ec 093A	Welfare Econ + Just	019	0.48	113	2,140	1,786	354		1	040		1100	Ed	24	Sp
Ec 093B	Poverty In Affl Soc	012	0.22	216	2,597	2,243	354		1	055		1100	Ed	27	Sp
Ec 11A	Princ Of Econ	046	0.84	47	2,140	1,786	354		1	055		900	Ed	27	Wi
Ec 11A	Princ Of Econ	048	1.20	49	2,367	2,013	354		1	040		900	Ed	24	Fa
Ec 11A	Princ Of Econ	039	0.71	61	2,367	2,013	354		1	055		1000	Ed	27	Sp
Ec 11B	Princ Of Econ	046	0.84	76	3,483	3,129	354		1	055		210	Ed	27	Wi
Ec 11B	Princ Of Econ	046	0.84	76	3,483	3,129	354		1	055		210	Ed	27	Sp
Ec 11B	Princ Of Econ	054	1.35	40	2,140	1,786	354		1	040		1000	Ed	24	Fa
Ec 32	Econ Pol + Problems	036	0.65	97	3,483	3,129	354		1	055		310	Ed	27	Fa
Ec 32	Econ Pol + Problems	050	0.91	70	3,483	3,129	354		1	055		110	Ed	27	Wi
Ec 401A	Ec Pol + Conds In Jn	040	0.77	34	1,354	1,000	354		1	052		1000	Ed	26	Sp
Ec 401B	Ec Pol + Conds In Jn	036	0.69	38	1,354	1,000	354		1	052		2-4	Ed	26	Sp
Ec 402	Commun Task Force	029		74	2,140	1,786	354		1			ARR			Sp
Count 16	Level Totals	555			39,635	33,97	5,664	00	16.0						
	Level Means			71					71						
	Upper Level														
Ec 51	Price + Dist	051	0.93	68	3,483	3,129	354		1	055		110	Ed	27	Sp
Ec 51A	Price + Dist	028	0.51	124	3,483	3,129	354		1	055		110	Ed	27	Fa
Ec 51B	Price + Dist	014	0.25	249	3,483	3,129	354		1	055		210	Ed	27	Fa
Ec 52	Hist Of Econ Thought	047	1.18	50	2,367	2,013	354		1	040		210-4	Ed	24	Wi
Ec 55A	Natl Inc + Bus Cycles	035	0.67	74	2,597	2,243	354		1	052		900	Ed	26	Wi
Ec 55B	Natl Inc + Bus Cycles	041	0.79	63	2,597	2,243	354		1	052		1000	Ed	26	Wi
Ec 57	Intru To Econometrics	014	0.35	153	2,140	1,786	354		1	040		900	Ed	24	Sp
Ec 59	Monetary + Fiscal	084		54	4,537	4,183	354		1			1000	Ph	Aud	Fa
Ec 59A	M + F Topics + Disc	018	0.44	252	4,537	4,183	354		1	041		210-4	Ed	23	Fa
Ec 72	Intl Econ	029	0.56	90	2,597	2,243	354		1	052		210-4	Ed	26	Fa
Ec 73	Econ Development	016	0.40	148	2,367	2,013	354		1	040		210-4	Ed	24	Sp
Ec 74A	Labor Economics	043	0.78	106	4,537	4,183	354		1	055		900	Ed	27	Sp
Ec 74B	Labor Economics	040	1.00	113	4,537	4,183	354		1	040		1000	Ed	24	Sp
Ec 75	Social Control	036	0.69	72	2,597	2,243	354		1	052		210-4	Ed	26	Sp
Ec 76	Economic History	046	1.15	47	2,140	1,786	354		1	040		1100	Ed	24	Fa
Ec 901	Independent Study	007		338	2,367	2,013	354		1			ARR			Wi
Ec 902	Group Ind Study	011		236	2,597	2,243	354		1			ARR			Fa
Ec 99	Senior Seminar	019		125	2,367	2,013	354		1			ARR			Wi
Count 18	Level Totals	579			55,330	48,958	6,372	00	18.0						
	Level Means			96					96						
Count 34	Program Totals	1,134			94,965	82,929	12,036	00	34.0						
	Program Means			84					84						

GU cost is the total cost divided by the number of graduation units produced, which equal, for each course section, the enrollment multiplied by the credit unit. In most programs at Ohio Wesleyan, mean GU cost is identical to mean student cost. (See Accounting, Management, and Economics in Exhibit 1.) Most courses are "term courses," carrying one graduation unit of credit each and ideally occupying one-third of the student's total working time. (Credit is not based on classroom meetings.) Some courses, primarily in the physical education and music programs, do not qualify as term courses and carry fractional graduation units of credit. In science programs, student costs for lecture and for laboratory sections are computed separately, but both are required to produce a graduation unit. Thus, for these departments, mean student cost is lower than mean GU cost. The main point is to compute average cost per credit unit. The computation is essentially the same whether credit is measured in graduation units, semester hours, or quarter hours.

Required data for the Course Cost Report are accumulated on a computer disk file. As previously explained, most of the raw data are readily available from other subsystems. The process of creating, or loading, the course cost disk is as follows:

Step 1. The subsystem pertaining to students and courses includes a disk record of course sections from which the following data is obtained, for each section offered during the year: course number, course name, student enrollment, credit, time, building, room, term (fall, winter, spring), and instructor. Added to this for each section are the departmental account number, program (HEGIS discipline) number, and faculty teaching load credit as specified by the office of academic affairs. Generally, a faculty member receives one unit of credit for a term course, and seven per year is the standard teaching load. As with student credit, some physical education and music sections carry fractional faculty load credit. Non-teaching assignments for which faculty members receive load credit are added to the disk file along with the amount of credit. Examples of such assignments include (a) leaves, (b) serving as departmental chairperson, (c) sponsored research or other activities, (d) general administrative assignments, and (e) coaching. Non-teaching assignment records are given a fictional term designation for processing purposes and a fictional course number for identification.

Step 2. From the payroll disk record is obtained each faculty member's total compensation, salary and fringe benefits. A computer program apportions the individual's compensation to his course sections and non-teaching assignments on the basis of the load credits. The computer then prints out this information in a report titled "Faculty Compensation Analysis," which is then reviewed for errors with the vice president for academic affairs, who also utilizes this report to evaluate faculty loads.

Faculty compensation is apportioned according to assignments, not according to time estimates obtained from questionnaires (a common approach). No cost is allocated to departmental research, committee work, advising, or other activities which all faculty members perform. There is no particular theoretical argument for this approach, but it has been found practical and useful for administrative purposes.

Step 3. From the accounting disk record are obtained the total expenditures by each department for clerical help, supplies, expendable equipment, travel, and miscellaneous. These are expenditures controlled by the academic department chairperson. In the responsibility accounting system, a separate account exists containing such controllable expenditures for each department and no other charges. Faculty compensation charges, controlled on this campus by the vice president for academic affairs and a faculty personnel committee, are in other accounts. For example, the year-end balance of Account 01113 represents the controllable expenditures of the chairperson of the department of botany and bacteriology.

To these controllable expenditure totals is added faculty compensation previously allocated in Step 2 to (1) non-teaching assignments related to the academic departments (primarily chairperson service) and (2) faculty leaves. A computer program then apportions each department total equally to each course section offered within the department.

Step 4. To the course cost disk, behind the regular file, are added two tables containing (1) account numbers and names, and (2) program numbers and names.

Step 5. Classroom capacities are added from a table built into a separate computer program.

Step 6. The course cost disk record is now complete. A program is run which calculates the unit costs and prints the Course Cost Report.

Step 7. The Instruction Program Cost Report is printed.

Totals Reconciled with Accounting Records

The grand totals are reconciled with the accounting records, expenditures for instruction and departmental research and for athletics. The system excludes compensation allocated to sponsored research and general administration from the instructional cost reports, but includes expenditures for athletics. All coaches are tenured faculty who also teach, and the physical education programs cannot be evaluated without examining athletics also. The reports contain athletic expenditures in totals only; no kind of unit cost is calculated. This is also true of certain other faculty-directed activities where participants are not earning academic credit—dramatics, debate, computer lab, and certain others. See Exhibit 3.

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Exhibit 3

Instruction Program Cost Report Fiscal Year 1973

	Number Of Sections	Student Enrlmnt	Mean Gu Cost	Mean Std Cost	Total Cost	Faculty Cost	Dept Cost
0701 Computers							
Lower Level	1	00	00	00	22,740	1,908	20,832
Program Totals	1	00	00	00	22,740	1,908	20,832
Dept Totals					22,740	1,908	20,832
01172 Crtl Lang Program							
1120 Critical Languages							
Lower Level	1	72	69	69	4,957	1,910	3,047
Program Totals	1	72	69	69	4,957	1,910	3,047
Dept Totals					4,957	1,910	3,047
01176 Black World Studies							
4901 General Liberal Arts							
Lower Level	3	43	261	261	11,238	10,500	738
Program Totals	3	43	261	261	11,238	10,500	738
Dept Totals					11,238	10,500	738
01181 General Athletic							
5001 Athletics							
Lower Level	1	00	00	00	29,943	3,400	26,543
Program Totals	1	00	00	00	29,943	3,400	26,543
Dept Totals					29,943	3,400	26,543
01184 Lacrosse							
5001 Athletics							
Lower Level	1	00	00	00	8,937	3,715	5,222
Program Totals	1	00	00	00	8,937	3,715	5,222
Dept Totals					8,937	3,715	5,222
01185 Wrestling							
5001 Athletics							
Lower Level	1	00	00	00	6,440	2,617	3,823
Program Totals	1	00	00	00	6,440	2,617	3,823

The long-range planning committee worked with instructional cost data for only one fiscal year, 1970. Since then, there has been the benefit of comparative data. Annual, computer-prepared reports have been used as a basis for comparative studies of cost trends and patterns resulting in a number of comparative analyses and graphs. The faculty committee on university governance cooperates with the administration in fiscal planning and budgeting.

University administrators have noted that the cost data enable the university staff to correlate academic effectiveness with financial efficiency. Tradition is no longer accepted as justification for a particular program or method of instruction. Rather, new cost awareness has resulted in the educational significance of traditional approaches being questioned.

Staff members have been computing and using instructional unit cost data at Ohio Wesleyan for four years. Three reports—the Instruction Program Cost Report (summary), the Course Cost Report (detailed), and the Faculty Compensation Analysis—are produced annually through the computer system and supplemented with comparative analyses and graphs.

The impetus for instructional costing work came from long-range planning committees composed of faculty, administrators, and students. Subsequently, top-level administrators and the faculty committee on university governance received and worked with the cost data.

The computer programs constitute a subsystem in a fairly complete integrated data processing system. The larger, integrated system makes the costing process easier and more efficient than it otherwise would be. The system is relatively simple, and the resulting data is useful for the university's administrative purposes.

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